REMARKS

Claim 29 has been canceled as it is duplicate of Claim 27.

The dependency of Claims 31 and 32 has been changed from Claim 27 to Claim 30 in order to correct typographical errors.

Applicants now assume the application is in condition for examination.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

31. (Twice Amended) The plasma reactor of Claim [27] 30 wherein said first and second magnetic cores are longitudinally movable toward and away from a center locus overlying a center of said wafer support, whereby to enable adjustment of plasma ion density near the center of said workpiece support relative to plasma ion density near a periphery of said wafer support.

32. (Twice Amended) The plasma reactor of Claim [27] 30 wherein said first and second windings are closely wound around said first and second magnetic cores respectively.

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SUBSTITUTE PAGES

1. A plasma reactor for processing a workpiece, said plasma reactor comprising:

an enclosure;

a workpiece support within the enclosure facing an overlying portion of the enclosure, said workpiece support and the overlying portion of said enclosure defining a process region therebetween extending generally across the diameter of said wafer support;

said enclosure having at least first and second openings therethrough near generally opposite sides of said workpiece support;

at least one hollow conduit outside of said process region and connected to said first and second openings, providing a first torroidal path extending through said conduit and across said process region;

a first coil antenna adapted to accept RF power, and inductively coupled to the interior of said hollow conduit and capable of maintaining a plasma in said torroidal path.

2. The plasma reactor of Claim 1 wherein said hollow conduit comprises a plenum extending around the axis of symmetry of said chamber and wherein said first and second openings are comprised within a continuous opening in said enclosure extending around the axis of symmetry of said chamber.

3. The plasma reactor of Claim 2 wherein said plenum and said continuous opening extend 360 degrees around the axis of symmetry of said chamber.

4. The plasma reactor of Claim 1 wherein said conduit is

formed of a metal material, said conduit having an insulating gap extending transversely to said torroidal path and separating said conduit into two portions so as to prevent formation of a closed electrical path along the length of said conduit.

5. The plasma reactor of Claim 1 wherein said coil antenna is wound around an axis generally parallel with the axis of said closed torroidal path.

6. The plasma reactor of Claim 5 wherein said coil antenna comprises a first winding extending on one side of and along said conduit.

7. The plasma reactor of Claim 6 wherein said coil antenna comprises a second winding extending on an opposite side of and along said conduit.

8. The plasma reactor of Claim 5 wherein said coil antenna comprises a winding disposed between said conduit and said chamber.

9. The plasma reactor of Claim 8 wherein said winding has an outer diameter less than an inner diameter of said conduit.

10. The plasma reactor of Claim 6 further comprising at least one magnetic core extending between said chamber and said conduit in a direction generally parallel to the axis of said closed torroidal path, said first winding extending around said magnetic core.

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11. The plasma reactor of Claim 7 further comprising at least one magnetic core extending between said chamber and said conduit in a direction generally parallel to the axis of said closed torroidal path, said first and second windings extending around said magnetic core.

12. The plasma reactor of Claim 8 further comprising at least one magnetic core extending between said chamber and said conduit in a direction generally parallel to the axis of said closed torroidal path, said winding extending around said magnetic core.

13. The plasma reactor of Claim 1 further comprising a closed magnetic core surrounding said conduit so as to have one portion of the magnetic core extending through a region between said chamber and said conduit, said coil antenna being wound around said closed magnetic core.

14. The plasma reactor of Claim 13 wherein said closed magnetic core has a second portion outside the region between said chamber and said conduit, said coil antenna being wound around a section of said second portion.

15. The plasma reactor of Claim 1 further comprising:

an array of pairs of openings through said vacuum enclosure, each pair of openings near generally opposite sides of said workpiece support;

an array of generally mutually parallel hollow conduits outside of said vacuum chamber that includes said one hollow conduit, and connected to respective ones of said pairs of openings, whereby to provide respective closed torroidal paths

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for plasma, each of said respective closed torroidal paths extending outside of said vacuum chamber through a respective one of said array of conduits and extending inside said vacuum chamber between a respective pair of said openings across said wafer surface.

16. The reactor of Claim 15 further comprising an array of antenna coils, each one of said antenna coils being inductively coupled to the interior of a respective one of said array of hollow conduits and capable of maintaining a plasma current in a respective one of said closed torroidal paths.

17. The reactor of Claim 16 further comprising plural separately adjustable RF power sources coupled to respective ones of said array of coil antennas, whereby the plasma ion density distribution across the surface of said workpiece is adjustable through individual adjustment of said plural RF power sources.

18. The reactor of Claim 17 further comprising plural discrete magnetic cores confined generally to respective regions between respective ones of said array of conduits and said vacuum enclosure, each of said array of coil antennas being wound around a respective one of said plural discrete magnetic cores.

19. The reactor of Claim 15 further comprising a common magnetic core extending between said array of hollow conduits and said vacuum enclosure, said coil antenna being wound around said common magnetic core.

20. The reactor of Claim 1 wherein said conduit has a width along an axis parallel with the plane of said wafer support which

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is at least as great as the diameter of said wafer support.

21. The reactor of Claim 20 wherein said conduit has a height along an axis perpendicular to the plane of said wafer support which is less than said width.

22. The reactor of Claim 21 wherein said conduit has a rectangular cross-section whereby to produce a relatively thin wide belt of plasma in said closed torroidal path.

23. The reactor of Claim 1 wherein the height of said closed torroidal path along an axis generally perpendicular to a plane of said wafer support in a process region overlying said workpiece support is less than elsewhere in said closed torroidal path, whereby to enhance the plasma ion density in said process region relative to the plasma ion density elsewhere in said closed torroidal path.

24. The plasma reactor of Claim 1 further comprising a conductive body between said workpiece support and said vacuum enclosure and constricting said torroidal path in a processing region overlying said wafer support.

25. The plasma reactor of Claim 24 wherein said conductive body comprises a gas distribution showerhead, said process gas supply being coupled to the interior of said chamber through said gas distribution showerhead.

26. The plasma reactor of Claim 25 further comprising a gas

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